Guaranteed Heating Satisfaction at minimum cost

for the Architect
Heating Contractor
and the Owner

Guaranteed Heating Satisfaction at minimum cost

THE truth about boiler ratings. A money saving discussion of the heating problem for the Architect, Heating Contractor and Owner.

THE H. B. SMITH COMPANY
Established 1854
Westfield, Massachusetts

Manufacturers of Smith Boilers for steam, hot water and vapor heating; radiators; and hot water supply boilers; for every type and size of private home, office building, factory and public building.

Sales Offices and Warehouses at
WESTFIELD, BOSTON, NEW YORK, PHILADELPHIA, CLEVELAND

"Sawin Hill, estate of Bayard Tuckerman in Hamilton, Massachusetts, where the Prince of Wales paid a brief visit in October, 1924. Heating is furnished by two number forty-four Mills Water Tube Boilers made by the H. B. Smith Company, Bigelow and Wadsworth, Architects; H. E. Whitten Company, Heating Contractors."

The Truth about BOILER RATINGS

A pertinent, money-saving discussion of interest to owners of homes and buildings, and to those who are about to build them.

THIS book is not intended to be a complete discussion of the heating problem. Its purpose is to discuss one phase of the heating problem only, namely: boiler ratings. Long experience in the heating industry has shown us that this phase of heating stands in great need of a simple, commonsense explanation.

If you have had to buy a heating boiler lately, or if there is a chance that you will have to buy one in the near future, you have discovered, or it will be to your advantage to discover beforehand, that the subject of boiler ratings is a stumbling block to the unwary.

Briefly, and non-technically, the rating of a boiler means the size of the heating job that it can do. The rating answers the question, "How large a home or building can this boiler heat?" Or, to ask the question in the other direction, "How large a boiler do I need to heat my home?"

This seems like a very simple matter. But it isn't.

A great deal of trouble and misunderstanding arises from the fact that there is no standard method of rating a boiler. Imagine the trouble that would be caused if there were no standard way of measuring a ton of coal—some dealers giving you 2000 pounds and some giving you only 1000 pounds to the ton. Imagine that and you begin to realize the situation that exists on boiler ratings.

Take any one particular boiler and ask several boiler manufacturers to give it a rating. You will receive as many different answers as there are manufacturers. In other words, each manufacturer will recommend the same boiler for a different size house. How can this be?

The strange part of the situation is judged solely on the basis of whether the boiler will furnish enough heat to keep the house warm, that one manufacturer is as right as another. Though each is different, each is right. What is the solution of this paradox?

It is true that by decreasing the length of the firing period (which is technical talk for saying that you will have to tend the fire oftener), and by working the boiler beyond its capacity, and by burning more pounds of coal per square foot of grate surface per hour—all the heat you need for the home can be developed.

But, oh, prospective owner, beware of the large coal bills that will be yours under such conditions. Warm, your home will be, and warm indeed your chimney—yet if you could see the tons of coal that you would have to shovel, the pyramids of ashes that would have to be carted away, and the sheaf of coal bills that would come from year to year, each one of wasted hot gases escaping up your chimney had a visible dollar sign attached to it, then you would indeed grow to despair and condemn your heating contractor to Hecklehamme, which has been located three miles the other side of the hot place. And

all because the rating of the boiler did not mean what, on the face of it, it seemed to mean.

It is the old story of low first cost on one hand, and of high operating cost on the other. And it is only human nature that has brought such a condition to pass.

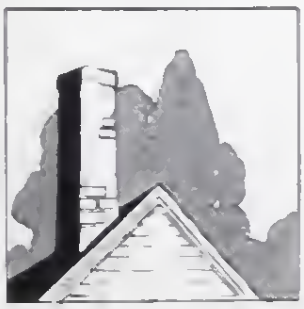
The Development of Boiler Ratings

IN THE early days of the boiler industry, scientific testing was of the unborn future. The manufacturer designed a model, estimated its capacity, installed a number of boilers, checked his estimates from these cellar demonstrations and rated his boiler for so many feet of net radiation.

In justice to all, it is only fair to say that rating a boiler is at best a difficult matter, because of factors that are hard to eliminate or hold constant. No two boiler installations are surrounded by identical conditions. The chimney may make all the difference in the world in the way a boiler performs.

Importance of the Chimney

IF THE boiler is the heart of the heating system, the chimney is the lungs. If the "lungs" are bad, even a good "heart" is of no avail. Chimneys must be high enough and wide enough. Too many openings into a chimney, as from fireplaces on floors above, greatly impair its efficiency. If higher buildings are close to yours; if wind currents are directed in certain ways against the chimney by the conformation of the roof, nearby trees or other buildings, and not properly compensated for in the design of the chimney, the boiler cannot deliver heat as efficiently as it might under more favorable conditions.



Quality of Coal Used

THE quality of the coal used is another factor that limits the efficiency of a boiler and upsets its rated capacity. Coal varies tremendously in the number of heat units it contains. Some manufacturers give their boilers a high rating on the assumption that the best grade of coal will be used. The ratings of Smith Boilers are such that better results can be expected from average quality coal.

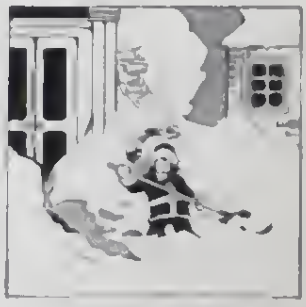
Coal in general is constantly becoming poorer. It is extremely important that a boiler have plenty of reserve capacity.

Keeping the Boiler Clean

ANOTHER factor hard to allow for in rating a boiler is the care it will receive in regard to cleaning. The products of combustion deposited within a boiler are almost perfect heat insulators. The more soot that is allowed to collect, the more difficult it is for the boiler to transmit heat to the water in the tubes, just as a badly carbonized automobile engine lacks power.

It is positively essential that the boiler be kept clean. In Smith Boilers, not only is the design such that soot deposits are reduced to a minimum, but they are also arranged for easy cleaning.

Imagine the difficulty an owner finds himself in on a cold winter morning if the boiler has been rated on the assumption that only the best quality coal will be used, that the chimney is perfect, and that the boiler is kept free of soot deposits at all times. Such conditions are far too ideal to be expected in this average world.



In addition to considering ideal rather than average operating con-

ditions, some boiler manufacturers also add to their rated capacity the heat which escapes into the cellar. Smith Boilers are rated only on the heat delivered to the system; in other words, at the nozzle.

End of Early Conservatism

MANUFACTURERS in the early days generally were conservative, inclined to rate their product too low rather than too high. Because these ratings were conservative they became the basis of boiler purchases. When it was seen that boilers were sold on ratings, of course some bright party raised his. While watching developments, the rest of the manufacturers went to the starting line and, figuratively speaking, warmed up their motors. The crowd fell for the raised ratings. Immediately the manufacturers gave their ratings the gas. The race was on and speed limits haven't counted since, although, of course, merely rating a boiler higher does not increase, and never can increase, its capacity for doing an economical job.

Most manufacturers have sincerely tried to furnish ratings that would give general satisfaction. But to keep increasing their ratings on identically the same boilers, in order to allow their contractors to underbid the contractors who sell other boilers, results only in confusion, in offering a purchaser a chance to save in first cost without clearly explaining the higher cost of operation which this entails.

Some day all this will be changed. The Bureau of Standards in Washington will take up the matter of ratings, and a standard method for figuring ratings will be determined. And then the man who buys the boiler will have nothing to fear. He will get enough heat to keep the house warm and be sure of burning a minimum amount of coal. But until that time comes it is well to

have a clear understanding of one's own of what determines the capacity of a boiler.

Basis of Economy

COAL at present and future prices is a more important factor in heating costs than it used to be. A reasonable increase in the economy and efficiency of a boiler and the yearly saving in fuel expense makes the first cost of the boiler a secondary matter.

It is time boilers were rated for efficiency and economy. What are the important facts in determining the efficiency and economy of a boiler? Grate capacity is one but it is far from being the most important. For while coal is burned on the grate, and a large grate naturally gives opportunity to burn a large amount of coal, "What becomes of the heat given off in combustion?"—is far more important. Otherwise, you might as well burn your coal in the bin, except for the fire risk.

Apples on the tree will not produce profit if they are going to rot there. You have got to get them to market. How are you going to market your heat? By means of fire surface! And did you ever notice how shy the average catalogue is in giving the amount of fire surface in boilers and explaining what type it is, whether direct or indirect? We have published ours for years. Fire surface is where the real business of the boiler is done; where the heat is absorbed and made available for distribution through the system.

If you want to prove the worth of fire surface, take the flue temperature of the escaping gases. If the fire surface has absorbed the heat, you won't find waste heat in the chimney, but if there isn't enough fire surface, or if

it is improperly designed, you will find a high chimney temperature and the heat from the coal is on the way to try to heat all outdoors. Before buying a boiler look up the fire surface. Insist on having these figures, and before accepting a rating find out what the temperature of the escaping flue gases is at that rating.

How Smith Boilers are Rated

FARTHER on in this book we reproduce several tables of rating figures as prepared for our three styles of boilers—the Mills Water Tube Boiler, the Smith Smokeless Boiler, and the H-B Round Boiler. At the end of the book you will find illustrations of typical sizes of these three types of boilers, with a brief note as to the types of buildings for which each is best adapted.

To get back to the tables on ratings mentioned just above. Each table shows three different ratings for each boiler. We have called these "Danger Red," "Practical Black," and "True Blue."

The "Danger Red" rating gives the capacity of the boiler if rated in the way that is in danger of becoming common practice. If you wish to turn a deaf ear to coal bills, in order to save a few dollars on the first cost of your boiler, you can get all the heat you want. That is, we would guarantee it under the conditions stated, but we have never recommended rating a boiler that way, and we do not now recommend it.

The "Practical Black" ratings are the commercial standard catalogue ratings which we have published, do publish, and shall continue to publish.

The "True Blue" ratings permit the boiler to operate with a maximum of fuel economy and heating satisfaction.

Turn to pages 18 to 25 where you will find these tables of ratings. Take the ratings for the No. 34 Mills Steam Water-Tube Boiler. On page 19 note that 10 sections are given a rating of 4900 feet of steam radiation when rated by the "Danger Red" method. Now note that our "Practical Black" rating, rates 13 sections, with 4800 feet of steam radiation. Here is a difference in first cost of the cost of three additional sections. The approximate amount of money this represents, exclusive of the extra labor charge involved in installing the additional three sections, is $250.

Now note the same chart again. The 10 sections No. 34 Mills "Danger Red" rated at 4900, burns 15 pounds, more or less, of coal per square foot of grate surface per hour. The 13 section, No. 34 Mills "Practical Black" rated at 4800 burns approximately 33⅓ per cent less per square foot of grate surface per hour. Under those conditions both boilers would keep the same house completely warm.

Cash Saving

NOT to get too involved in a technical discussion, our engineers have figured that in a boiler-winter season of 30 weeks, the 13 section boiler would save 7 to 10 tons of coal, depending upon geographical location, type of building construction, and care given to the boiler, or, in money, about $160.

The above figures show approximate savings when the boilers are operated at the capacity shown. Now the fact is that the usual operation of the boiler will be less than full capacity rating, due for instance to warm spells of weather and the banking of the fire at night. But even in such average operation, the owner can be sure of a saving in operating cost per year of 15 per cent on his

investment, if the larger boiler is used, as it would be if rated on the basis of our "Practical Black" ratings.

Compare this cash saving mentioned with the saving in first cost if you used the 10 section boiler. Then consider that the boiler is bought only once, whereas you buy coal for the same boiler twenty, thirty or forty years. Multiply the saving of one season by forty and the total saving is $6400!

We have a number of boilers giving excellent service today that were installed over forty years ago, which is longer than most boiler manufacturers have been in business. We are the pioneers in the industry. Our products have stood for quality since 1860.

The excessively high temperatures of escaping flue gases, under "Danger Red" ratings, indicate absolute waste of coal and prove that boilers operating at a rate of combustion to justify such "Danger Red" ratings cannot absorb into the system, an economical percentage of the available heat.

Another example found on page 21, with reference to the No. 27 Smith Boiler, shows that the temperature of the gases escaping up the chimney under the "Danger Red" rating is 1000 degrees Fahrenheit (more or less), while the temperature of the escaping gases under the "True Blue" rating is 525 degrees Fahrenheit (more or less). Our "Practical Black" ratings fall in between these two.

With the No. 27 Smith Boiler the "True Blue" ratings involve a flue temperature of 525 degrees. Highly rated competing boilers under conditions to obtain their ratings would show flue temperatures 800 to 1200 degrees, because of their less efficient design.

For most other makes of boilers, 600 to 1000 degrees is often considered a normal flue temperature, which in-

dicates a tremendous waste of heat, neither absorbed by the boiler nor in any way turned to good account in heating your home.

It is a fact also, as touched upon earlier, that the high consumption of coal per square foot of grate surface per hour required before such high rating figures and flue temperatures could possibly be reached, demand in turn an ideal chimney of a diameter and height found in exceedingly few heating installations. Any boiler selected on inflated "Danger Red" ratings cannot do the heating job assigned to it under usual conditions, and on cold days the house would remain cold in spite of immense coal consumption.

It goes back to the old question they used to like to puzzle us with in school—"Which contains more heat; a kettle of boiling water or the Atlantic Ocean?" And the correct answer is the Atlantic Ocean—just as the greater number of square inches of fire surface in the 13 section boiler, although at a lower temperature, transmits the heat from the burning coal through the heating systems to the rooms of the home or building more efficiently than the fewer and hotter square inches of fire surface in the 10 section boiler.

Does it Pay to Increase Ratings Arbitrarily?

AN ILLUSTRATION of an arbitrary increase in rating is shown in the following figures which compare our "Practical Black" ratings with another manufacturer's ratings, old and new, of a boiler of the same number of sections and of practically identical outside measurements. The other manufacturer's old ratings were

enough larger than ours to make a nice first cost saving to the unwary. But note how his new ratings give him a still greater advantage in telling the merits of first cost:

Sections	*Our Ratings*	*Other Manufacturers Old Ratings*	*Other Manufacturers New Ratings*
8	6000	8000	9600
9	7200	9000	10800
10	8400	10000	12000
11	9600	11000	13200
12	10800	12000	14400

WE HAVE an interesting story, and a true one, of an experience with another manufacturer's boiler. In a certain house the boiler, which had been installed for some years, had never been made to heat the house comfortably even in weather ordinarily cold. The contractor admitted that a mistake had been made in the size of the boiler used and they advised replacing the first boiler with another of greater capacity.

The latest catalogue of the manufacturer was secured and a boiler of higher rating was ordered. The old boiler was taken down and taken out. Then the new boiler was put in. Imagine the consternation of the owner when he discovered that the new boiler of greater capacity was of identically the same size as the first one that would not heat the house. What had happened? Only this: the manufacturer had in the meantime arbitrarily raised his ratings so that in his catalogue the same boiler was now rated at a greater capacity. The manufacturer had been caught in his own trap. We leave it to you to imagine what the owner said about it, and to decide whether that way of rating a boiler is practical.

While we are on the subject, another experience story is not out of place. In Springfield, Mass., there is a man

who owns four apartment houses, which, while not exactly alike, are practically identical. In two of them he has H. B. Smith Boilers and in the other two he has boilers of another make. Within the last year he converted all four to oil burners. A result which represents a problem to him is the fact that the two boilers of another make burn fifty per cent more oil than the two H. B. Smith Boilers.

In view of this saving in operation of the Smith Boilers, the economy of scrapping the other boilers is evident, even though they are of recent installation. Economy of operation is the true index of boiler cost.

Our Ratings Close to Ideal

THERE is one more point to be brought out as shown in the tables of ratings. The "Practical Black" ratings seem to be about half way between the "Danger Red" ratings and the "True Blue" ratings. You may ask why we do not keep our "Practical Black" ratings closer to the "True Blue" ratings, since "True Blue" ratings are ideal for operating economy.

The discrepancy is only an apparent one. As you increase the load in the boiler, that is, as you increase

the rating above the "True Blue" rating, the rate at which you lose fuel economy does not increase in the same proportion. It is very low at first but when you get farther away from the "True Blue" ratings it increases very rapidly. That is, when a 25 per cent increase in ratings is made, in a Mills No. 34 for instance, your loss in fuel economy is only 3 per cent. When a 50 per cent increase in rating is made, your loss in fuel economy is 8 per cent. But when a 100 per cent (approximate) increase in rating is made, you get a 25 per cent loss in fuel economy. In other words, our "Practical Black" ratings mean only a negligible loss, whereas the "Danger Red" ratings mean a 25 per cent loss. These losses vary with different sizes and types of boilers. Some boilers under "Danger Red" ratings show a loss as high as 60 per cent or more.

A Question Often Asked

"IF A person doesn't investigate this subject of ratings carefully," said a customer recently to one of our engineers, "and if, unknowingly, he is unfortunate enough to install a boiler that has "Danger Red" ratings, what is to prevent him from going on for years in ignorance of the fact that he is burning altogether too much coal?

"Of course, I can see that friends who have been luckier than he may tell him that they burn considerably less coal. But even so, isn't he apt to think that the difference in coal burned lies in the type of house or in its location?"

This is a question which we are often asked. And the answer is that a boiler which has been "Danger Red" rated will reveal the fact to the owner as soon as a few days of exceptionally cold weather arrive. During ordinarily cold weather such a boiler will heat the house comfortably. But in exceptionally cold weather it has

no reserve capacity to give you. You are operating it under peak conditions all the time. Whereas the "Practical Black" or the "True Blue" boiler does have a reserve that is able to keep you warm even in periods of exceptionally cold weather.

Such extreme low temperatures do not often come, it is true. But do not lose sight of the main point, which is, not the matter of furnishing comfortable heat under extreme conditions, but the matter of economy all winter long in coal.

When Jack Frost invites us into his below-zero presence, he quickly puts a finger on the house with the "Danger Red" rated boiler. "You're cold in this house today," he says with a chuckle, "but that isn't the worst of it. The worst of it is that you are burning up more coal than you should every day all winter long."

Replacement Pays Well

FOR the especial interest of home or building owners who have to replace an old or inefficient boiler, we quote the following letter, which is typical of what often happens:

> "As you know, I have two pieces of property in Roxbury at 2033 and 2045 Columbus Avenue, which are identical as to size in the number of apartments and with exactly the same amount of radiation. In each case there are new flues 12 x 16 inches in diameter.
>
> "In one Building I put in four years ago a Boiler other than you make to heat these apartments. As the Boiler was of proper capacity of course it did the work. Year before last I heated

the other Building with one of your nine section No. 36 Smith Boilers, which was of the same capacity as the other Boiler. After a while my janitor reported that the Smith Boiler was burning much less coal than the other Boiler. I made a test on this and found his statements to be correct. I immediately gave orders to have the other Boiler taken out and to have another one of your nine section No. 36 Smith Boilers installed. This was done and immediately cut down my coal consumption.

"In connection want to say that my old Boiler burnt ninety tons of hard coal at $15.00 per ton, and the Smith Boiler burnt sixty tons of soft coal at $8.50 per ton. A saving of $910.00 per season on each Boiler."

"From the foregoing statement I have come to the conclusion that the initial cost of the heating Boiler is only a secondary consideration, as I have found the largest overhead expense on Apartment House property is the coal bill.

"This spring I have also replaced three other Boilers that were in good condition with Boilers of your make. My only reason for changing was of the fact of the saving in fuel."

No. 24 MILLS WATER TUBE BOILERS

(Anthracite Coal, Oil, Gas and Coke)

No. 24 MILLS		"DANGER RED" Feet of Radiation			"PRACTICAL BLACK" Feet of Radiation	"TRUE BLUE" Feet of Radiation		
STEAM	5 Sections	Temperature of escaping flue gases 750°FAH. plus or minus.	1340	16 lbs. plus or minus coal per sq. ft. of grate per hour.	900	Average temperature of escaping flue gases 400° FAH	550	4 to 5 lbs. coal per sq. ft. of grate per hour.
	6 "		1720		1125		700	
	7 "		2100		1350		850	
	8 "		2480		1575		1000	
	9 "		2860		1800		1150	
	10 "		3240		2025		1300	
WATER	5 Sections	Temperature of escaping flue gases 750° FAH. + or —	2200	16 lbs. + or — coal per sq. ft. of grate per hour.	1500	Average temperature of escaping flue gases 400° FAH.	900	4 to 5 lbs. coal per sq. ft. of grate per hour.
	6 "		2850		1875		1150	
	7 "		3475		2250		1400	
	8 "		4100		2600		1650	
	9 "		4725		2975		1900	
	10 "		5350		3350		2150	

3% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
8% " " " " " 50% " " " " " " "
30% " " " " " load equals "Danger Red" Ratings.

No. 34 MILLS WATER TUBE BOILERS

(Anthracite Coal, Oil, Gas and Coke)

No. 34 MILLS		"DANGER RED" Feet of Radiation		"PRACTICAL BLACK" Feet of Radiation	"TRUE BLUE" Feet of Radiation		
STEAM	6 Sections	Temperature of escaping flue gases 650° FAH. plus or minus.	2700	2000	Average temperature of escaping flue gases 350° FAH.	1500	6 to 7 lbs. of coal per sq. ft. of grate per hour.
	7 "		3250	2400		1750	
	8 "		3800	2800		2000	
	9 "		4350	3200		2250	
	10 "		4900	3600		2500	
	11 "		5450	4000		2750	
	12 "		6000	4400		3000	
	13 "		6550	4800		3250	
	14 "		7100	5200		3500	
WATER	6 Sections	Temperature of escaping flue gases 650° FAH. + or —	4450	3300	Average temperature of escaping flue gases 350° FAH.	2475	6 to 7 lbs. coal per sq. ft. of grate per hour.
	7 "		5375	3950		2900	
	8 "		6275	4625		3300	
	9 "		7175	5275		3725	
	10 "		8075	5950		4125	
	11 "		9000	6600		4550	
	12 "		9900	7250		4950	
	13 "		10800	7925		5375	
	14 "		11725	8575		5775	

15 lbs. + or — coal per sq. ft. of grate per hour.

3% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
8% " " " " " 50% " " " " " " "
25% " " " " " load equals "Danger Red" Ratings.

No. 44 MILLS WATER TUBE BOILERS

(Anthracite Coal, Oil, Gas and Coke)

No. 44 MILLS		"DANGER RED" *Feet of Radiation*			"PRACTICAL BLACK" *Feet of Radiation*	"TRUE BLUE" *Feet of Radiation*		
STEAM	7 Sections	Temperature of escaping flue gases 700° FAH. + or —	4320	17 lbs. + or — coal per sq. ft. of grate per hour.	3600	Average temperature of escaping flue gases 425° FAH.	2400	6 to 7 lbs. coal per sq. ft. of grate per hour.
	8 "		5140		4200		2800	
	9 "		5960		4800		3200	
	10 "		6780		5400		3600	
	11 "		7600		6000		4000	
	12 "		8420		6600		4400	
	13 "		9240		7200		4800	
	14 "		10060		7800		5200	
	15 "		10880		8400		5600	
	16 "		11700		9000		6000	
WATER	7 Sections	Temperature of escaping flue gases 700° FAH. plus or minus.	7125	17 lbs. plus or minus coal per sq. ft. of grate per hour.	5950	Average temperature of escaping flue gases 425° FAH.	3950	6 to 7 lbs. coal per sq. ft. of grate per hour.
	8 "		8475		6925		4625	
	9 "		9825		7925		5275	
	10 "		11175		8900		5950	
	11 "		12550		9900		6600	
	12 "		13900		10900		7250	
	13 "		15250		11875		7925	
	14 "		16600		12875		8575	
	15 "		17950		13850		9250	
	16 "		19300		14850		9900	

4% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
10% " " " " " 50% " " " " " " "
30% " " " " " load equals "Danger Red" Ratings.

No. 27 SMITH SMOKELESS BOILERS

(All Bituminous Coals, Anthracite Coal, Oil, Gas and Coke)

No. 27 SMITH		"DANGER RED" *Feet of Radiation*			"PRACTICAL BLACK" *Feet of Radiation*	"TRUE BLUE" *Feet of Radiation*		
STEAM	5 Sections	Temperature of escaping flue gases 1000° FAH. plus or minus.	1700	15 to 20 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.	1200	Average temperature of escaping flue gases 525° FAH.	800	4 to 7 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.
	6 "		2150		1500		1000	
	7 "		2600		1800		1200	
	8 "		3050		2100		1400	
	8 "		3500		2400		1600	
	10 "		3950		2700		1800	
	11 "		4400		3000		2000	
	12 "		4850		3300		2200	
	13 "		5300		3600		2400	
	14 "		5750		3900		2600	
	15 "		6250		4200		2800	
	16 "		6700		4500		3000	
WATER	5 Sections	Temperature of escaping flue gases 1000° FAH. + or —	2800	15 to 20 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.	1975	Average temperature of escaping flue gases 525° FAH.	1325	4 to 7 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.
	6 "		3500		2475		1650	
	7 "		4300		2975		1975	
	8 "		5025		3475		2300	
	9 "		5775		3950		2650	
	10 "		6525		4450		2975	
	11 "		7250		4950		3300	
	12 "		8000		5450		3625	
	13 "		8750		5950		3950	
	14 "		9500		6425		4300	
	15 "		10325		6925		4625	
	16 "		11050		7425		4950	

5% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
12% " " " " " 50% " " " " " " "
35% " " " " " load equals "Danger Red" Ratings.

No. 36 SMITH SMOKELESS BOILERS

(*All Bituminous Cools, Anthrocite Coal, Oil, Gas and Coke*)

	No. 36 SMITH	"DANGER RED" *Feet of Radiation*			"PRACTICAL BLACK" *Feet of Radiation*	"TRUE BLUE" *Feet of Radiation*		
STEAM	7 Sections	Temperature of escaping flue gases, 1100° FAH. + or —	3930	18 to 24 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.	2300	Average temperature of escaping flue gases 575° FAH.	1800	5 to 8 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.
	8 "		4550		2800		2100	
	9 "		5200		3300		2400	
	10 "		5850		3800		2700	
	11 "		6500		4300		3000	
	12 "		7150		4800		3300	
	13 "		7800		5300		3600	
	14 "		8450		5800		3900	
	15 "		9100		6300		4200	
	16 "		9750		6800		4500	
	17 "		10400		7300		4800	
	18 "		11050		7800		5100	
WATER	7 Sections	Temperature of escaping flue gases 1100° FAH. plus or minus.	6425	18 to 24 lbs. coal per sq. ft. of grate per bour, according to size of grate selected.	3800	Average temperature of escaping flue gases 575° FAH.	2975	5 to 8 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.
	8 "		7500		4625		3475	
	9 "		8575		5450		3950	
	10 "		9650		6275		4450	
	11 "		10725		7100		4950	
	12 "		11800		7925		5450	
	13 "		12875		8750		5950	
	14 "		13950		9575		6425	
	15 "		15025		10400		6925	
	16 "		16100		11225		7425	
	17 "		17150		12050		7925	
	18 "		18225		12875		8425	

6% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
15% " " " " " 50% " " " " " " "
40% " " " " " load equals "Danger Red" Ratings.

No. 60 SMITH SMOKELESS BOILERS

(All Bituminous Coals, Anthracite Coal, Oil, Gas and Coke)

No. 60 SMITH		"DANGER RED" *Feet of Radiation*		"PRACTICAL BLACK" *Feet of Radiation*	"TRUE BLUE" *Feet of Radiation*	
STEAM	8 Sections	Temperature of escaping flue gases 900° FAH. plus or minus.	8600	6000	Average temperature of escaping flue gases 550° FAH.	4200
	9		10000	7200		4900
	10		11400	8400		5600
	11		12800	9600		6300
	12		14200	10800		7000
	13		15600	12000		7700
	14		17000	13200		8400
	15		18400	14400		9100
	16		19800	15600		9800
	17		21200	16800		10500
	18		22600	18000		11200
	19		24000	19200		11900
	20		25400	20400		12600
			18 to 24 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.			7 to 10 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.
WATER	8 Sections	Temperature of escaping flue gases 900° FAH. + or —	14200	9900	Average temperature of escaping flue gases 550° FAH.	6925
	9		16500	11900		8075
	10		18800	13850		9250
	11		21100	15850		10400
	12		23400	17800		11550
	13		25700	19800		12700
	14		28000	21800		13850
	15		30300	23750		15025
	16		32600	25750		16175
	17		34900	27700		17325
	18		37200	29700		18475
	19		39500	31700		19625
	20		41800	33650		20800
			18 to 24 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.			7 to 10 lbs. coal per sq. ft. of grate per hour, according to size of grate selected.

5% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
12% " " " " " 50% " " " " " " "
30% " " " " " load equals "Danger Red" Ratings.

H-B ROUND BOILERS

(Anthracite and Bituminous Coals, Oil, Gas and Coke)

H-B ROUND		DANGER RED Feet of Radiation			PRACTICAL BLACK Feet of Radiation	TRUE BLUE Feet of Radiation		
STEAM	No. 115	Temperature of escaping flue gases 1100° FAH plus or minus	300	14 lbs. plus or minus coal per sq. ft. of grate per hour	150	Average temperature of escaping flue gases 400 FAH	125	4 to 4½ lbs. coal per sq. ft. of grate per hour
	[illegible]		400		[illegible]		175	
	210		[illegible]		475		225	
	[illegible]		[illegible]		500		300	
	[illegible]		[illegible]		600		350	
	[illegible]		[illegible]		650		400	
	[illegible]		1200		800		500	
WATER	No. 115	Temperature of escaping flue gases 1100° FAH or [illegible]	500	14 lbs. or [illegible] coal per sq. ft. of grate per hour	[illegible]	Average temperature of escaping flue gases 400 FAH	200	4 to 4½ lbs. coal per sq. ft. of grate per hour
	217		650		550		300	
	210		875		700		375	
	221		1125		825		500	
	223		1350		1000		575	
	224		1600		[illegible]		650	
	[illegible]		[illegible]		1500		825	

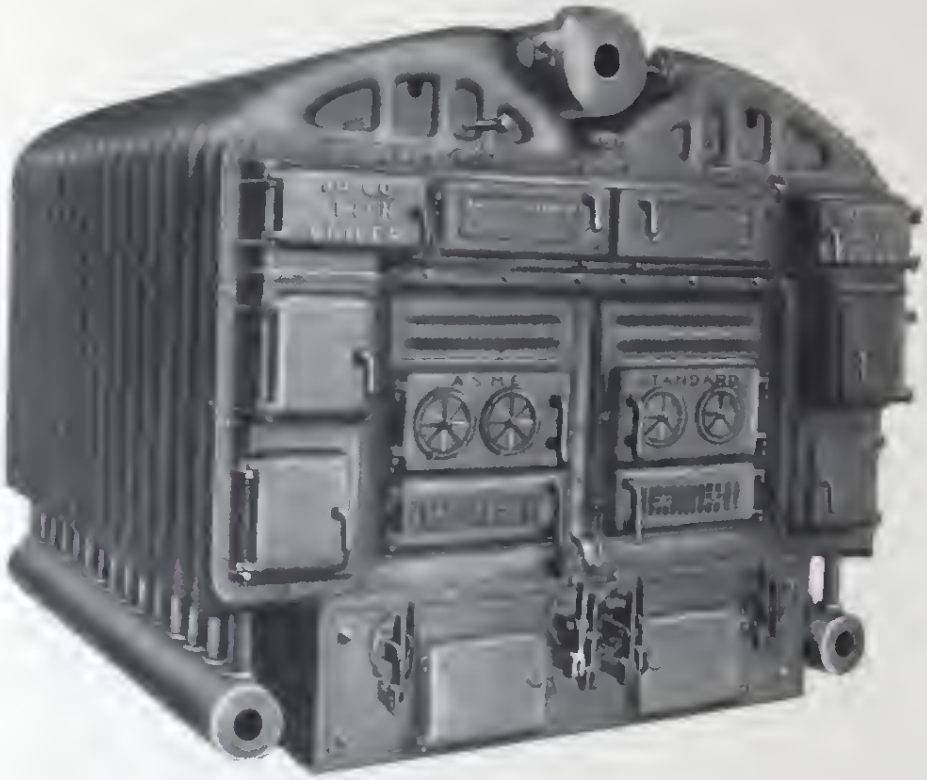
[illegible]% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
20% " " " " " 50% " " " " " " "
[illegible]% " " " " " load equals "Danger Red" Ratings.

H-B ROUND BOILERS

(Anthracite and Bituminous Coals, Oil, Gas and Coke)

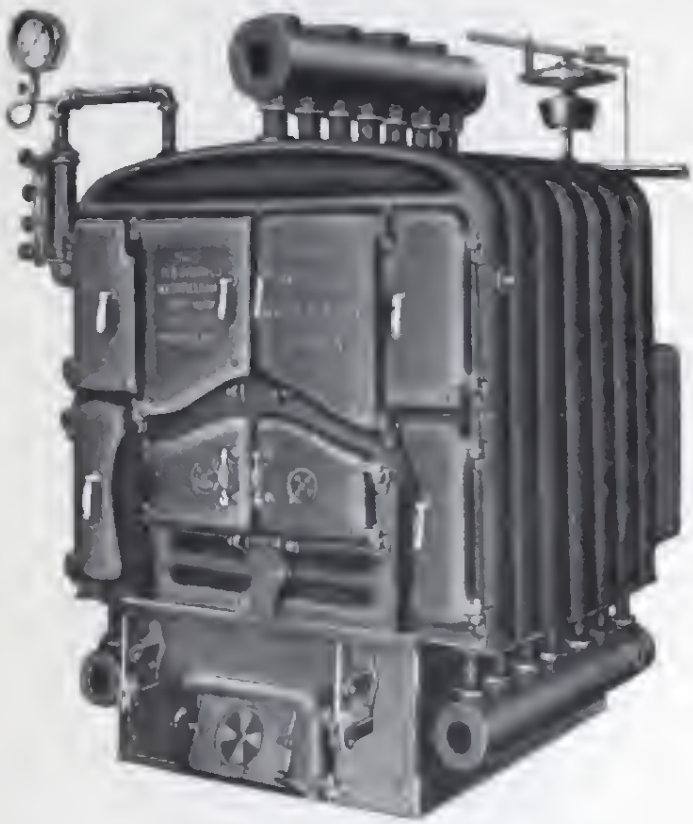
H-B ROUND	"DANGER RED" *Feet of Radiation*		"PRACTICAL BLACK" *Feet of Radiation*	"TRUE BLUE" *Feet of Radiation*		
STEAM No. 317	Temperature of escaping flue gases 900° FAH. +or−	450	375	Average temperature of escaping flue gases 400° FAH.	200	4½ to 5 lbs. coal per sq. ft. of grate per hour.
" 319		575	475		250	
" 321		725	550		350	
" 323		875	700		425	
" 324		1075	800		475	
" 327		1300	1000		575	
	12 lbs. + or − coal per sq. ft. of grate per hour.					
WATER No. 317	Temperature of escaping flue gases 900° FAH. plus or minus.	750	625	Average temperature of escaping flue gases 400° FAH.	325	4½ to 5 lbs. coal per sq. ft. of grate per hour.
" 319		950	775		425	
" 321		1200	900		575	
" 323		1450	1150		700	
" 324		1775	1325		775	
" 327		2150	1650		950	
	12 lbs. plus or minus coal per sq. ft. of grate per hour.					

6% Loss in fuel economy when 25% load is added to "True Blue" Ratings.
15% " " " " " 50% " " " " " " "
45% " " " " " load equals "Danger Red" Ratings.



No. 60 Smith Smokeless Boiler

FOR steam or hot water heating of large residences and public buildings. It will burn any kind of fuel; all grades of bituminous coals and lignites with a minimum amount of smoke, conforming to all smoke ordinances; minimum amount of attention; maximum amount of efficiency, and will burn all other fuels—anthracite coal (all sizes), coke (all sizes), oil, wood, with a maximum amount of efficiency.



No. 34 Mills Water Tube Boiler

FOR steam or hot water heating. The economy of the Mills Water Boiler is due to its vertical water tubes which the hot flames envelope and the fact that the Mills Boiler has a larger per cent of direct fire surface than any other boiler. Made in sizes Nos. 24, 34, 44 and 48.

No. 224 H. B. Round Boiler

FOR steam or hot water heating of average size homes. Will burn anthracite and bituminous coals, oil, gas or coke. Made in size Nos. 15, 17, 19, 21, 23, 24 and 27.

Smith No. 17 Hy-Test Boiler for Hot Water Supply

TESTED to 300 lbs. hydrostatic pressure per square inch, this boiler properly installed insures absolute safety, no matter what the local conditions, and will supply hot water at a fraction of the cost of gas heaters. The American Society of Mechanical Engineers Standards. Made in sizes Nos. 110, 113, 17 and 24, for small homes up to the largest of buildings.

Princess Direct Radiator

PRINCESS radiators are radically different in design from ordinary radiators. Note the wide spacing between the sections. The purpose of the wide spacing is to increase efficiency. If the radiator were covered with a blanket, the transmission of heat to the air in the room would cease. The same thing tends to happen when the sections of a radiator are closely nested. The wide spacing between sections in the Princess radiator permits the free circulation of air over its heated surfaces, resulting in the rapid transmission of heat, and making the Princess the most efficient of radiators.

Furthermore, wide spacing is important because it permits the radiator to be easily cleaned, preventing unsightly and unhealthy accumulations of dust and dirt.

A *few famous places* where Smith Products *are installed*

White House

Chevy Chase

Lincoln Memorial

THE foregoing pages have been prepared with the sincere desire to point out to owners, and those about to own, the unwisdom of always accepting the rating of a boiler as the only criterion for its suitability for heating your property.

A representative from one of our branch sales and warehouses, or any architect familiar with our product, or any heating contractor who handles our products, will gladly help you apply and adapt this information to fit your own needs.